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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Shigetaka Hamada

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EXAMINER

BERHANU, SAMUEL

ART UNIT

PAPER NUMBER

2838

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/735,694	HAMADA ET AL.	
	Examiner	Art Unit	
	SAMUEL BERHANU	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 20 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 4, 5 and 7-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 4-5, 7, 15-17 and 19 is/are allowed.
- 6) ☒ Claim(s) 8-11 and 14 is/are rejected.
- 7) ☒ Claim(s) 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 8-11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchner et al. (DE 196 49 434 C1) (hereinafter Buchner) in view of Muchinc et. al. (US 6,558,824) (hereinafter Muchinc), in view of in view of Yi et. al. (US 6,586,123) (hereinafter Yi), in view of Uozumi (US 6,709,779), and further in view of Acker (US 6,322,917)

Regarding Claim 8, Buchner discloses, a diagnostic method for a fuel cell comprising a plurality of cells, comprising: supplying an anode of the fuel cell with hydrogen or a hydrogen-containing gas; measuring a voltage of each cell under a condition in which the hydrogen or the hydrogen-containing gas is supplied to the anode of the fuel cell, and determining an amount of cross-leak based on the measured gas pressure at the anode, the measured gas pressure at the cathode and on a measured voltage of each cell (Page 1, Paragraph 2, Page 2, paragraph 6 ,Page 3, Paragraph 1).

Buchner does not disclose explicitly the cathode is vacuumed, measuring a gas pressure at the anode; measuring a gas pressure at the cathode; introducing a cooling medium into a battery of the fuel cell; and changing a temperature of the cooling medium when measuring the voltage of each cell;

Muchinc discloses in the abstract, column 2, lines 1-5, and claims 8 and 19, the cathode is vacuumed.

Yi discloses in Figure 1, elements 40 and 42, measuring a gas pressure at the anode; measuring a gas pressure at the cathode at the cathode (see also Column 4, lines 34-39, lines 44-48).

Uozumi discloses in Figures 1-24, a cooling medium (see figure 15 element 10) into a passage with the fuel cell (see column 1, lines 5965, Column 2, lines 15-20).

Acker discloses in Column 9, lines 18-22, changing a temperature of the cooling medium when measuring the voltage of each cell.

It would have been obvious to a person having ordinary skill in the art at the time of the invention to add a vacuum injecting means in Buchner's fuel cell stack as taught by Muchine in order to remove the water to ensure proper test results and provide effective fuel cell leak monitoring system, and also add measuring means as taught by Yi in Buchner's gas leak determination method in order to avoid errors that could be introduced using formulas and mathematical equations

. Further, It would have been obvious to a person having ordinary skill in the art at the time of the invention to use cooling medium as taught by Uozumi and monitor a voltage of a fuel cell while temperature change is occurred as taught by Acker in Buchner Fuel cell test system in order to monitor/ determine abnormalities that may occur in the fuel cell, increase the operating efficiency of fuel cell and prevent any fuel cell damage due to heat.

As to Claim 9, Buchner discloses, wherein in the determining step, an amount of hydrogen cross-leak of each cell is determined from the measured voltage of each cell generated based on a principle of a hydrogen concentration cell (Page 2, Paragraph 2)

As to Claim 10, Buchner discloses, wherein the voltage of each cell is measured in a state where the plurality of cells are stacked (Page 1, Paragraph 3)

As to Claim 11, Buchner discloses, changing at least one of the gas pressure at the anode and the gas pressure at the cathode when measuring the voltage of each cell (Page 2, Paragraph 2) (noted that the formula in Page 3, line 15 teaches that the voltage of each cell can be calculated with different value of pressure).

As to Claim 14, Uozumi discloses in Figures 1-24 wherein the changing a temperature of the cooling medium changes the temperature of the fuel cell from a first temperature in the range of normal operation to a second temperature within the range of normal operation.

Response to Arguments

3. Applicant's arguments with respect to claim 8 have been considered but they are not persuasive.

Applicant argues that there would be no need to regulate the temperature of the fuel cell of Buchner, because it is unlikely that the temperature of the fuel cell in Buchner will be as high as it would be in the normal operational. However, that is not quite correct, because there is no statement in Buchner that stated temperature regulation means is unnecessary or it makes the system inoperable. So having temperature regulation means as suggested by the applied references are a way of

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improving Buchner's gas leak determination method because the temperature of the fuel cell of Buchner could go high by virtue of heat generated through a chemical reaction between hydrogen and inert gas such as argon or nitrogen when electricity is generated.

4. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

5. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, cooling medium will increase the operating efficiency of fuel cell and prevent any fuel cell damage due to heat.

6. In response to applicant's argument that Uozuim and Acker are nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's

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endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, all the references are directed to controlling and monitoring fuel cell system.

7. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

8. It is also noted that all the claimed elements of applicant's inventions were known in the prior art (e.g. temperature regulation, fuel cell leakage determination method, anode and cathode spaces, cooling medium in fuel cell, etc.,) and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention, proper motivation/rationale to combine is as given in the office action. See *KSR*, 127 S. Ct. at 1740, 82 USPQ2d at 1396.

Allowable Subject Matter

9. Claims 1, 4-5, 7, 13, 15-17 and 19 allowed.
10. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
11. The following is an examiner's statement of reasons for allowance:

For Claim 1: primarily, the prior art of record does not disclose or suggest in the claimed combination: detecting an amount of the inert gas supplied to the cathode; wherein the amount of cross-leak is calculated based on the pressure of the hydrogen containing gas at the cathode, on the total pressure of the inert gas supplied to the cathode, and on the amount of the inert gas supplied to the cathode

For Claim 19: primarily, the prior art of record does not disclose or suggest in the claimed combination: determining the amount of cross-leak of each cell by calculation the following equation;

$$P_{H_2(C)} = \{(\text{cross-leak amount})/(\text{cathode-side gas amount})\} \times P_{\text{TOTAL}(C)}, \text{ wherein}$$

(i) $P_{H_2(C)}$ is calculated by using the equation,

$$E = 2.3026 \times \{(RT)/(2F)\} \times \log_{10} \{P_{H_2(a)}/P_{H_2(C)}\}, \text{ wherein}$$

E: electromotive force of a cell (potential difference detected by cell voltage monitors 40)

R: gas constant=8.31 (J/mol • K)

F: Faraday constant

T: temperature (°K)

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P_{H_2} (a): anode-side, or anode hydrogen pressure (KPa abs);

(ii) $P_{TOTAL}(c)$ is a value measured by the manometer located in the inert gas supply piping; and

(iii) the cathode-side gas amount is calculated, at least in part, on the value measured by the mass flow controller.

For Claim 18: primarily, the prior art of record does not disclose or suggest in the claimed combination: detecting an amount of the inert gas supplied to the cathode; Calculating an amount of cross-leak based on the pressure of the hydrogen- containing gas at the cathode, on the total pressure of the inert gas supplied to the cathode, and on the amount of the inert gas supplied to the cathode

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAMUEL BERHANU whose telephone number is (571)272-8430. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Akm Ullah can be reached on 571-272-2361. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Akm Enayet Ullah/
Supervisory Patent Examiner, Art
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Examiner, Art Unit 2838